

Digital Projectors

(including Short Throw, Ultra Short Throw and Long Throw projectors)



Digital projectors have become critical to the integration of ICT in learning and teaching in schools. Along with a PC or laptop they can be used with a wide range of interactive ICT devices such as visualisers, wireless mouse and keyboard, wireless slates and interactive whiteboards. Recent technology advances in short throw and ultra short throw digital projectors virtually eliminate presenter shadow effects and glare on the screen when presenting. As these new types of Projector are mounted over the 'teaching position' and close to the teaching wall they virtually eliminate the possibility of eye damage from the projectors beam.

What is a Digital Projector?

Teachers generally use a digital projector, in conjunction with a laptop or desktop computer, to project the computer screen image on to a screen or wall. Digital projectors are extremely useful and effective teaching tools that facilitate a range of learning opportunities when connected to a desktop computer in whole class teaching scenarios. In addition further functionality is achieved by using the projector with a wireless mouse/keyboard, wireless slate, a visualiser (ref' Advice sheet 36), or an interactive whiteboard (ref' Advice Sheet 16).

Short throw and Ultra Short throw projectors are recommended by NCTE for new installations in general classrooms, computer rooms, labs and workshops as they provide a number of advantages over conventional long throw projectors. An NCTE schools procurement framework exists for Digital Projectors to simplify the process of purchasing for schools.



Ultra Short Throw and Short Throw Digital projectors

Short Throw and Ultra Short Throw digital projectors

Short Throw and Ultra Short Throw digital projectors are relatively new (ie in the last 3 years) however they are suitable for classrooms and for use with a wide range of equipment including a wireless mouse/keyboard, a wireless slate, a visualiser, or an interactive whiteboard. They typically mount on a short mounting bracket from the teaching wall and are positioned over the teaching position. As a result the presenter (teacher or pupil) who is 'up at the board' will not be looking in to the projector beam, thus virtually eliminating concerns relating to possible eye damage, especially where a projector is used a lot in class by teachers and students. Shadowing effects and glare are also virtually eliminated.

Possible Educational Uses

The following points list some of the more common uses for Digital Projectors.

- Highly effective as a means of instruction or demonstration in classrooms, computer rooms, staff training, or parents groups.
- Presenting student work to the whole class.
- Image projection in conjunction with wireless mouse/keyboard, wireless slate, a visualiser, or an interactive whiteboard.
- Displaying and browsing Web sites in a controlled and collaborative manner.
- Demonstrating or using educational software in a whole class context.
- In conjunction with a TV, video or internet source, a digital projector provides a means of presenting video to student/parent audiences.
- As a means of display/interaction in a classroom situation. Students with special needs can particularly benefit from material being presented visually as it can aid in both information processing and retention.
- Enhancing professional development with staff groups via large screen projection
- Facilitating video conferencing via large screen group participation

Purchasing Considerations

When purchasing a digital projector it is recommended to use the NCTE's Digital Projector Framework which can be found at www.ncte.ie/projectorframework. The purpose of the framework is to ensure that a number of high quality digital projectors are available to schools and that a simple and straightforward method of purchasing them was provided. All projectors on the framework are of a high quality and come with a minimum 3 year on site warranty, so if the lamp unit or another component goes faulty during the 3 year period it is replaced free of charge by the supplier under the warranty. An installation service is also available as an option via the framework or alternatively the school can arrange a local installation without affecting the digital projector warranty. For details of projector costs please refer to the framework as they may change from time to time. Better value and lower cost will most likely be obtained by a school if a higher number of projectors are being purchased simultaneously. In addition to these costs installation costs will vary depending on number of units to be installed.

Short Throw or Ultra Short Throw projectors may be more expensive per unit cost than ceiling mounted long throw fixed projectors but they are more suitable for schools and generally easier to install than long throw projectors, and so the overall cost may not be that much different than that of conventionally ceiling mounted long throw projectors.

Luminosity (Brightness)

The luminosity of a digital projector is measured in lumens and it is an important consideration when purchasing a digital projector. **According to research by Becta in UK, "Brightness of 1,500 ANSI lumens will be adequate for the majority of classrooms"** though this advice was developed by Becta for Long Throw projectors. Short throw projectors with a luminosity of over 1,500 lumens are suitable for schools. Most modern projectors generally have two luminosity settings, namely a) standard and b) eco mode. In eco mode the luminosity is set at the lower setting which coupled with lower noise is more appropriate for a regular classroom environment. The brightness of the image displayed is also affected by the amount of light available in the room and in some cases window blinds may be needed to regulate the amount of external daylight entering the room.

Safety:

All long throw or portable digital projectors, regardless of brightness, if misused, have the potential to cause eye damage, and hence some simple guidelines should be followed:-

- Ensure that staff or pupils never look directly into the beam of the projector, as this may cause eye damage.
- Use a suitable pointing device during presentations to avoid having to enter the beam of the projector
- If using a portable projector, try and locate it out of the sight line from the screen to the audience; this ensures that, when presenters look at the audience they do not have to stare toward the projector lamp.
- According to 'Becta' in the UK, for long throw or portable projectors 'A maximum of 1,500 ANSI lumens is generally considered adequate for projection equipment in most classroom environments, except in the most extreme ambient lighting conditions.' Thus brightness levels in long throw projectors should generally be reduced (to do so please refer to the projector user manual).
- For new installations, NCTE recommends schools to purchase Short Throw or Ultra Short Throw digital projectors as they make it easier for the presenter to avoid being caught in the projector beam. They are also appropriate for use with interactive tools such as visualisers, wireless mouse or slates and interactive whiteboards.

Resolution

The resolution of the data projector is another major factor. The resolution of computer screens has tended to increase in recent years. A computer screen resolution of 800 X 600 is referred to as SVGA, while a screen of 1024 X 768 is referred to as XGA. Data projectors will typically project their own native resolution, but will also compress a higher resolution. This compression will result in some loss of definition. **Since most school computers will be XGA resolution, and nearly all laptops have XGA or higher, projectors with XGA resolution or better are strongly recommended.** A digital projector should automatically detect the resolution and type (analogue or digital) of incoming video signal (from the computer) and adjust accordingly. It may be worthwhile to check different resolutions when purchasing a data projector to see what is the optimum resolution for the classroom. Most modern projectors do this.

Contrast Ratio

Another image quality indicator to be considered when reviewing a digital projector specification is the contrast ratio. This is denoted in proportions such as 400:1. The contrast ratio indicates differences in brightness in the unit's projection of black and white. The greater the ratio, the more colour detail the projector can show. Schools should seek a contrast ratio of 400:1 or greater, as lower ratios may create less sharp or blurred looking images.

LCD vs DLP Technologies

There are two main projector technologies available when you are considering what type of projectors to get. LCD (Liquid Crystal Display) is the most common type of data projector available. DLP (Digital Light Processing) is a more recent technology which used thousands of tiny mirrors to create the image. It is smaller than a LCD projector filling a demand for small light weight projectors. Both technologies are suitable for schools.

Lamp Life

The lamp unit (including the bulb) inside a digital projector is key to its functionality and it is important to have information about its lifespan and the cost of replacement once the warranty expires.

Newer projectors generally have long lamp life as the lamp/bulb technology has improved in recent years. The NCTE's digital projector framework includes a 3 year warranty for the projector and lamp unit including free replacement of faulty lamps within the 3 year period, therefore spare lamp units are not required within the warranty period. After that if the 3 year warranty is not extended and is allowed to lapse by the school then a school should have a spare bulb for its projectors.

The lamp unit may need to be replaced at some point, so it is worth checking the price and lifespan of individual manufacturers' bulbs. Quality lamp units have a lifespan of 3000 hours, but some only last 1,000 to 1,500 hours even though they are priced similarly. Some providers will offer a free spare lamp. Replacement lamps (outside of lamp warranty) will typically cost €150 - €300 (inc VAT) depending on the model. A significant factor in how long a projector bulb will operate well is determined by the number of times it is turned on and off during its lifetime, Many projectors have recommended powering off procedures which if adhered to will prolong the life of the bulbs, Alternatively not adhering to these can significantly shorten the bulb life.

Keystone Correction

Keystone correction adjusts for the fact that if a projector is directed towards the screen at an angle, the projected image will be distorted; the edge furthest away from the projector will be wider than the edge closest to the projector. In other words, the image will appear in the shape of a trapezoid. The projectors keystone correction feature can correct this thus allowing the audience to view a rectangular image rather than one with a wider top or bottom.

Noise level /Eco Mode/Brightness

Low levels of projector noise are important especially in smaller classrooms or learning areas. Projector noise is typically caused by the internal fan which is used to cool the bulb. The lower the noise level the better. Levels of 36dB in normal mode or 30dB in Eco mode are considered quite good. Switching to Eco mode can also extend the bulb life by reducing the brightness, associated heat levels, and power consumption. Use in Eco mode is recommended as the lower brightness levels may be more appropriate for regular use especially in classrooms.

Maintenance and Care

When a digital projector is purchased, it is advisable to ensure that certain designated school staff are appropriately trained on how to operate and take care of the equipment. Dust filters should be regularly removed and cleaned in line with manufacturers guidelines – this will extend the life of the lamp unit. It is important to know that the lamp should be allowed to cool down fully after turning off the digital projector. The internal cooling fan may run for 5 minutes after the machine has been 'switched off' and, after this period, it automatically turns itself off. The projector should not be unplugged until this has taken place.

Security:

Schools should be aware that projectors may be seen as attractive target in schools. Certain models have clear labelling and markings indicating to potential thieves that the projector will not operate without a security code, and such features may be useful in a school setting.

Relevant Web Sites

Using a Data Projector

www.northcanton.sparcc.org/~technology/Tutorials/Files/Using_a_Data_Projector.pdf

A practical 'how to' guide to assist in connecting and using a digital projector with a computer.

Middlesex University – Using Digital projectors with a Laptop.

www.lr.mdx.ac.uk/comp/gen/pdfs/Data_Projector.pdf

This is a generic guide on how to operate a digital projector with a laptop

Digital Projector

www.maths.unsw.edu.au/computing/compdata.html

The School of Mathematics and Statistics provides a number of notebooks (laptops) and portable data projectors so that staff are able to hold lectures or give presentations containing a computer demonstration, or slides maintained as computer files. This HOW-TO gives a description of how to set up such a demonstration.

Note: While the advice sheets aim to act as a guide, the inclusion of any products and company names does not imply approval by the NCTE, nor does the exclusion imply the reverse. The NCTE does not accept responsibility for any opinions, advice or recommendations on external web sites linked to the NCTE site.

This Advice Sheet and other relevant information are available at:

www.ncte.ie/ICTAdviceSupport/AdviceSheets